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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/580,491	05/23/2006	Horst Vestweber	14113-00012-US	2381
23416 7590 06/24/2009 CONNOLLY BOVE LODGE & HUTZ, LLP P O BOX 2207 WILMINGTON, DE 19899				
EXAMINER				
CLARK, GREGORY D				
ART UNIT		PAPER NUMBER		
1794				
MAIL DATE		DELIVERY MODE		
06/24/2009		PAPER		

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/580,491

Applicant(s)

VESTWEBER ET AL.

Examiner

GREGORY CLARK

Art Unit

1794

Period for Reply -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-29 is/are pending in the application.
- 4a) Of the above claim(s) 27 is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-26, 28 and 29 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SF/ICE)
Paper No(s)/Mail Date 05/23/2006, 08/04/2006
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date ____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: ____

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

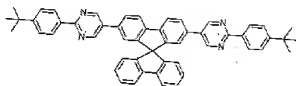
1. **Claims 1-2, 4-5 and 7-12 and 21 are rejected under 35 U.S.C. 102(b) as being anticipated by Wong (2004/0147742) as evidenced by Igarashi (20030039858).**

2. **Regarding Claim 1**, Wong discloses a spirobifluorene-based pyrimidine conjugated oligomer in an organic luminescent device (OLED) used as in a number of functions which includes a host in a light emission layer (organic EL layer) and a hole-blocking layer (abstract). The light emission layer also contains perylene as an emitter (dopant) (paragraph 70).

The examiner takes the position that perylene is a phosphorescent dopant.

Igarashi teaches that perylene is a commonly used phosphorescent material in electroluminescent devices (paragraph 58).

Wong also discloses that the device contains an anode, a cathode, (paragraphs 1 and 2). The compound of Formula 2 represents the fluorene-based pyrimidine conjugated oligomer (shown below):



Formula 2

Formula 2 shows a spirobifluorene bond to two substituted pyrimidine rings (heteroaromatic ring with 2 nitrogen atoms ($Q=2$) bonded to a phenyl group).

The applicant claims the compound represented by Formula 1 shown below:



Where Q is N or CR and Q is at least two and a maximum of four nitrogen atoms and R can be an aromatic group. The applicant further claims a compound with NR^1 where R^1 can be a heteroaromatic ring having 1 to 40 aromatic carbons.

Formula 2 disclosed by Wong reads on Formula 1 claimed by the applicant.

3. **Regarding Claim 2**, Wong discloses that the device contains an electron transporting layer (abstract).
4. **Regarding Claims 4 and 5**, Wong discloses that the compound represented by Formula 2 can be the material used for the hole-blocking layer (abstract) and Formula 2 represents a substituted pyrimidine (abstract).

5. **Regarding Claim 7**, Wong discloses that the compound represented by Formula 2 is applied in six different layers (one than one unit) of the device (paragraph 45).

6. **Regarding Claims 8-10**, Wong discloses that the compound represented by Formula 2 which has tert-butyl groups attached to the phenyl rings. The examiner takes the position the tert-butyl groups contains non-planar sp³ hybridized carbon atoms and a central quaternary carbon atom.

7. **Regarding Claims 11 and 12**, Formula 2 disclosed by Wong represents a 9, 9'-spirobifluorene derivative.

8. **Regarding Claim 21**, Wong discloses that the compound represented by Formula 2 can absorb UV-visible light (paragraph 12). The examiner interprets this to mean that Formula 2 has photoreceptive properties.

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. **Claims 3, 14 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wong (2004/0147742).**

11. **Regarding Claim 3**, Wong discloses that the OLED has a hole blocking layer composed of Formula 2 (paragraph 45) but fails to mention what percentage is present. The applicant claims at least 50% of the compounds represented by Formula 1. Wong further discloses the hole blocking layer prevents absorption in undesired regions (paragraph 40).

With the expectation of success, a person of ordinary skill in the art at the time of the invention would have adjusted the percentage of the spirobifluorene material in the hole-blocking layer to prevent absorption in undesired regions which would have included the range claimed by the applicant. This would be a result effective variable wherein the amount present would be related to the effect realized.

12. **Regarding Claim 14**, Wong discloses that the OLED has a hole blocking layer composed of Formula 2 (paragraph 45) but fails to mention the thickness of the hole blocking layer. The applicant claims a thickness of 1 to 50nm. Wong further discloses the hole blocking layer prevents absorption in undesired region.

With the expectation of success, a person of ordinary skill in the art at the time of the invention would have adjust the thickness of the hole-blocking layer to optimize the blocking of absorption in undesired regions which would have included the range claimed by the applicant.

13. **Regarding Claim 22**, Wong discloses a spirobifluorene-based pyrimidine conjugated oligomer in an organic luminescent device (OLED) (abstract). Wong discloses pyrimidine that has two ring nitrogen atoms (Q) but fails to teach a heterocyclic ring bonded to the spirobifluorene with three nitrogen atoms or the phenyl rings can be substituted (R') with F, Cl, Br, I or a boron derivative.

The examiner takes the position that the emissive properties of spirobifluorenes substituted with heterocyclic groups is known in the art and going from a six membered aromatic ring system with two nitrogen atoms to six membered aromatic ring system with three nitrogen atoms (i.e. pyrimidine to triazine) would have been an obvious variation in which a skilled synthetic chemist would have carried out at the time of the experiment with a reasonable expectation of success. The change in the heterocyclic ring structure in going from a six membered aromatic ring system with two nitrogen atoms to six membered aromatic ring system with three nitrogen atoms is viewed as a minor change to the core molecule that would not result in significant changes in the emissive properties. Likewise the substitution of the phenyl groups with halogens or a boron derivative would have been an obvious variation. The substituted spirobifluorenes that result would be expected to have the same of similar properties, absent unexpected results.

14. **Claim 15-20 and 22-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wong (2004/0147742) in view of Tominaga (20030168970).**

15. **Regarding Claims 15-17**, Wong discloses a spirobifluorene-based pyrimidine conjugated oligomer in an organic luminescent device (OLED) (abstract) where the light emission layer also contains a phosphorescence emitter (dopant) (paragraph 70). Wong discloses the use of perylene (phosphorescent emitter) with a spirobifluorenes (Formula 2) but fails to teach an example included in the list presented in claim 15 or a phosphorescent emitter as a compound having an atomic number of greater than 36 and less than 84.

Tominaga discloses an OLED that contains a spirobifluorene (emissive substance) (abstract) and the emissive layer can also contain phosphorescent dopant materials such as perylene, carbazoles (per claim 15), rhodamine-metal complex or tris(2-phenylpyridine)iridium complex (contains Ir atomic number 77, per claims 16-17) (paragraph 47).

Wong and Tominaga disclose OLEDs based on spirobifluorenes that can use perylene as a phosphorescent emitter.

Whereas perylene, carbazoles, rhodamine-metal complex or tris (2-phenylpyridine) iridium complexes are used by Tominaga as phosphorescent emitters in OLEDs containing a spirobifluorene, these materials are considered as functional equivalents. With a reasonable expectation of success a person of ordinary skill in the art at the time of the invention would have selected from known phosphorescent emitting materials such as those disclosed by Tominaga. The substitution of one known phosphorescent material for another equivalent phosphorescent material would make it

obvious to exchange perylene for carbazoles or a tris (2-phenylpyridine) iridium complex.

16. **Regarding Claim 18 and 19**, Wong discloses a spirobifluorene-based pyrimidine conjugated oligomer in an organic luminescent device (OLED) (abstract). Wong fails to disclose the process by which the layers are coated.

The examiner takes the position that Wong teaches the limitation of claim 1 and it is commonly known in the art that coating layers can be applied by a sublimation process or as vapor deposition process (equivalent to OVPD) is common in the art (see Tominaga, paragraph 43).

17. **Regarding Claim 20**, Wong discloses a spirobifluorene-based pyrimidine conjugated oligomer in an organic luminescent device (OLED) (abstract). Wong fails to disclose the layers are coated by a printing process.

The examiner takes the position that the usage of a printing process as a means to apply the layers is a process limitation.

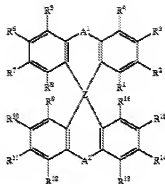
If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." (In re Thorpe, 227 USPQ 964,966). Once the examiner provides a rationale tending to show that the claimed product appears to be the same or similar to that of the prior art, although produced by a different process, the burden shifts to the applicant to come forward with evident establishing an unobvious difference

between the claimed product and the prior art product (in re Marosi, 710 F.2nd, 802, 218 USPQ 289, 292 (Fed. Cir. 1983, MPEP 2113).

18. **Regarding Claims 22 and 23**, Wong discloses a spirobifluorene-based pyrimidine conjugated oligomer in an organic luminescent device (OLED) (abstract). Wong discloses pyrimidine that has two ring nitrogen atoms (Q) but fails to teach a heterocyclic ring bonded to the spirobifluorene with three nitrogen atoms or the phenyl rings can be substituted (R') with F, Cl, Br, I or a boron derivative.

The examiner takes the position that the emissive properties of spirobifluorenes substituted with heterocyclic groups is known in the art and going from a six membered aromatic ring system with two nitrogen atoms to six membered aromatic ring system with three nitrogen atoms (i.e. pyrimidine to triazine) or the substitution of the phenyl groups with halogens or a boron derivative would have been obvious variations that are well known in the art.

Tominaga discloses an OLED that contains a spirobifluorene (emissive substance) (abstract) represented by the compound of Formula 3 shown below:



Formula 3

Tominaga discloses that A1 and A2 can be single bonds and Z can be a carbon atom (abstract). R1-R16 can be halogen (per claim 23), an alkyl or alkenyl or alkynyl (per claim 24) or heterocyclic (abstract). Tominaga further discloses that the heterocyclic group can be a triazine ring (per claims 22, 23 (three ring nitrogen atoms, Q= 3) (paragraph 64).

The emissive properties that result from the above variations would by the same or similar to those taught by Wong, absent unexpected results.

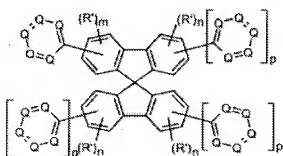
19. **Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wong (2004/0147742) in view of Wu (Applied Physics Letters, 2002, vol. 81, no 4, p. 577-579).**

20. **Regarding Claim 13**, Wong discloses a spirobifluorene-based pyrimidine conjugated oligomer in an organic luminescent device (OLED) (abstract). Wu shows

that the Tg of the spirobifluorene-based pyrimidine (Formula 2) used by Wong is 195°C.

21. **Claims 1, 5-6, 11-12, 15-20, 22-26 and 28-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tominaga (20030168970).**

22. **Regarding Claims 1, 5-6, 22-24,** Tominaga discloses an OLED that contains a spirobifluorene (emissive substance) (abstract). The device contains a hole blocking layer (paragraph 17). The spirobifluorene compound is shown above as Formula 3. Tominaga discloses that A1 and A2 can be single bonds and Z can be a carbon atom (abstract). R1-R16 can be hydrogen (m or n = 0 per claim 24), halogen (per claim 22), an alkyl or alkenyl or alkynyl (R' per claim 24) or heterocyclic (abstract). Tominaga further discloses that the heterocyclic group can be a triazine ring (per claims 5, 6, 22, 23 (three ring nitrogen atoms, Q= 3) (paragraph 64). The applicant claims the compound represent by Formula 4 (shown below):



Formula 4

23. **Regarding Claim 2**, Tominaga discloses that the device can contain an electron transporting layer (paragraph 18).

24. **Regarding Claims 11 and 12**, Formula 3 disclosed by Tominaga represents a 9,9'-spirobifluorene derivative.

25. **Regarding Claims 15-17**, Tominaga discloses that the emissive layer can also contain phosphorescent dopant materials such as perylene, carbazoles (per claim 15), rhodamine-metal complex or tris(2-phenylpyridine)iridium complex (contains Ir atomic number 77, per claims 16-17) (paragraph 47).

26. **Regarding Claims 18-19**, Tominaga discloses that the coating layers can be applied by a sublimation process or as vapor deposition (paragraph 43).

27. **Regarding Claim 20**, Tominaga discloses a spirobifluorene compound in an organic luminescent device (OLED) (abstract). Tominaga fails to disclose the layers are coated by a printing process.

The examiner takes the position that the usage of a printing process as a means to apply the layers is a process limitation.

If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." (In re Thorpe, 227 USPQ 964,966). Once the examiner

provides a rationale tending to show that the claimed product appears to be the same or similar to that of the prior art, although produced by a different process, the burden shifts to the applicant to come forward with evident establishing an unobvious difference between the claimed product and the prior art product (in re Marosi, 710 F.2nd, 802, 218 USPQ 289, 292 (Fed. Cir. 1983, MPEP 2113).

28. **Regarding Claim 25**, Tominaga discloses that R1-R16 can be substitution with a triazine ring (paragraph 64). This is in scope with a spirobifluorene substituted with two triazine ring attached to the same fluorene subunit.

29. **Regarding Claims 26 and 28**, Tominaga discloses that R1-R16 can be an alkenyl or alkynyl (abstract).

The examiner takes the position that at the time of the invention it would have been obvious to a person of ordinary skill in the art to synthesis a spirobifluorene derivative having a vinyl substituent present to act as the reactive functional group from which triazine could be co-reacted to make oligomeric triazine repeat units.

30. **Regarding Claim 29**, Tominaga discloses an OLED that contains a spirobifluorene compound (emissive substance) (abstract). Tominaga does not mention the use of the device.

The examiner takes the position that OLEDs are well known in the art to be useful a in host of electronic devices which would include: a light emitting diode, an

organic solar cell, an organic transistor, an integrated circuit, an laser diode, and a organic photorepector.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to GREGORY CLARK whose telephone number is (571)270-7087. The examiner can normally be reached on M-Th 7:00 AM to 5 PM Alternating Fri 7:30 AM to 4 PM and Off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Larry Tarazano can be reached on (571) 272-1515. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/D. Lawrence Tarazano/
Supervisory Patent Examiner, Art Unit 1794

GREGORY CLARK/GDC/
Examiner
Art Unit 1794

